INTERNATIONAL SYMPOSIUM ON:

THE EFFECTS OF GLOBAL CHANGE ON FLOODS, FLUVIAL GEOMORPHOLOGY AND RELATED HAZARDS IN MOUNTAINOUS RIVERS

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BOOK OF ABSTRACTS

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Cover images: impacts of a flash flood in the town of Braunsbach. Photos: Ana Lucía Vela (June 2016)

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HYDROMORPHOLOGICAL EFFECTS OF AN OPEN STONE RAMP ON FLOOD EVENTS IN THE SAALACH RIVER

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Man-made structures in the Saalach River produced feedback on the hydromorphological characteristics of the river regime. In some river reaches, the Saalach has lost most of its former typical characteristics of a mountain river with high variation in discharge and sediment transport. Among the negative effects, an extreme flow discharge in combination with the river bed variation can be one of the possible causes of flood disasters along the river. As an example, the heavy and long lasting rainfall in June 2013 led to an enormous flood with a peak discharge of 1100 m^3/s, which was close to a 100-year flood. Currently, the city of Freilassing is not protected against such a flood-event sufficiently.

With the aim of protecting against erosion and keeping the river bed on a defined stable level, in 2005/06 an open stone ramp has been constructed at river kilometre (rkm) 4.6 upstream of the hydropower plant Rott. In order to analyse the stone ramp for hydromorphological consistency and evaluate its influence during flood events, a numerical model for this river stretch has been developed at the Chair of Hydraulic and Water Resources Engineering, TUM. The model concept is based on the computer program TELEMAC-SISYPHE, and extended with our own developments for graded sediment transport in rivers. This task is quite important for a correct representation of river bed armouring and layering. Using the new concept, the transient composition of different bed layers and the exchange processes between them due to fractional sediment transport can be described more sufficiently. The new model provided adequate and stable numerical hydromorphological results.

In this paper, we present fundamentals of the modelling work including the model development, calibration, validation and implementation. Several scenarios have

been created to identify critical areas and evaluate countermeasures. Remarks on reducing the water levels in the floodplain and improving the flood protection for Freilassing are also proposed.

Mountainous areas are considered sensitive to so-called global change, considered as the combination of climate and land use changes. All panels on climate evolution predict future scenarios of increasing frequency and magnitude of floods which are likely to lead to huge geomorphic adjustments of river channels so major metamorphosis of fluvial systems is expected as a result of global change. Such pressures are likely to give rise to major ecological and economic changes and challenges that governments need to address as a matter of priority. A key question is how our understanding of these hazards associated with global change can be improved; improvement has to come from integrated research which includes the climatological and physical conditions that could influence the hydrology and sediment generation and hence the conveyance of water and sediments and the vulnerabilities and economic repercussions of changing hydrological hazards.

Within this framework, the purpose of the symposium was to bring together researchers from several disciplines as hydrology, fluvial geomorphology, hydraulic engineering, environmental science, geography, economy (and any other related discipline) to discuss the effects of global change over the river system in relation with floods. The symposium tried to improve our understanding of how rivers are likely to evolve as a result of global change and hence address the associated hazards of that fluvial environmental change concerning flooding.